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SMITH, GAMBRELL & RUSSELL
1130 CONNECTICUT AVENUE, N.W., SUITE 1130
WASHINGTON, DC 20036

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| EXAMINER |
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FORD, NATHAN K

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| ART UNIT | PAPER NUMBER |
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1792

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06/03/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|--------------------------------------|---|--|
| Office Action Summary | Application No. 10/533,932 | Applicant(s) NISHIBAYASHI, TAKAHIRO | |
| | Examiner NATHAN K. FORD | Art Unit 1792 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,6,8-12,17,18,20-23,27,30,32 and 34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,6,8-12,17,18,20-23,27,30,32 and 34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION*Applicant's Response*

Acknowledged is the applicant's request for reconsideration received March 23, 2009. Claims 27 and 32 are amended; claims 31 and 33 are canceled.

The applicant observes that whereas air flows through each of Masao's processing units, the casings (19-22) of the instant invention are respectively isolated with regard to air flow. This feature of isolation reduces the number of blowers and filters necessary to operate the apparatus.

In response, the examiner concurs with the applicant's assertion -- Masao's processing units are not sealed to the passage of air therethrough. Further, the examiner encourages the applicant to positively claim this distinguishing feature of casing isolation. As written, amended claim 32 does not explicitly recite the feature of casing isolation with respect to air flow, but merely requires air to flow around each casing. It should be noted that this language does not exclude those systems which flow air both around *and* through a casing. And as Drawing 2 of Masao delineates, air does in fact circumscribe each casing in addition to flowing through each casing. Thus, the previously applied prior art already satisfies the current claim limitations.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 8-12, 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masao, JP 2002-064044, wherein machine translation was used, in view of Hirose, US 5,762,745, and Kuwabara et al., JP 04-217353, wherein the translated abstract is relied upon.

Claims 1, 8, 12: Masao teaches the following:

- A substrate process section (2) (Drawing 3);
- A transfer section (12) for transferring the substrate to the process section;
- A transfer mechanism (TR) for transferring the substrate between the transfer section and the process section [0017];
- Multiple process towers within the process section, further comprising (Drawing 2):

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- A plurality of stacked process units housed in casings (SD1, HP1, HP2, etc.);
- A coating unit (SC1) which coats with a chemical liquid [0018];
- A temperature control unit (CP2);
- A heating unit (HP3) to heat the substrate [0020];
- Wherein the temperature control unit (CP2) is disposed at a level below the heating unit (HP3), and the coating unit (SC1) is disposed at a level below the temperature control unit;
- Wherein units HP4 and ACU are disposed between the heating and temperature control units, and the temperature control and coating units, respectively. Regardless of the internal processes occurring within HP4 and ACU, merely their interposition between two casings is sufficient to beget insulative affects.

Regarding the claim elements drawn to process sequencing, substrate transfer sequencing, and the composition of the chemical liquid to be dispensed by the coating unit: A recitation concerning the manner in which a claimed apparatus is to be employed does not differentiate the apparatus from prior art satisfying the claimed structural limitations (*Ex parte Masham*, 2 USPQ2d 1647). Masao's apparatus has the capability to reproduce the applicant's claimed operational sequences.

Masao does not detachably configure the process units nor does the apparatus flow air upward. Concerning the former omission: Hirose, disclosing a substrate processing apparatus, teaches vertically stacked process units (21-23) that collectively compose the process tower. Each unit is individually detachable to enable cleaning or maintenance (3, 39-46; 1, 38-44; claim 1). Given this teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to render detachable the units of Masao's process tower to enable cleaning and maintenance.

Concerning the latter omission: Masao elaborates air blowing mechanisms (38, 32) connected to the processing unit and an air inlet port disposed at the top of the tower. However, as stated previously, the air is exhausted downward rather than upward as claimed. Nevertheless, the technique of flowing air upwardly through a process tower toward an exhaust port is well-known in the art. Kuwabara, for instance, disclosing a semiconductor tower housing multiple, vertically-stacked units, disposes an air blowing mechanism atop the tower to upwardly draw and evacuate air through an exhaust port. This technique is employed to modulate the temperature of the processing units. In light of a disclosure demonstrating the art-recognized suitability of employing upward air-flow within a vertical processing chamber, it would have been obvious to one of ordinary skill in the art at the time the invention was made to configure Masao's fans to direct air upwardly to achieve the predictable result of controlling the

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temperature of the processing units. Upon instituting this flow reversal, the air inlet port (21) of Masao will function as the exhaust port connected to the air passageway, and air will flow upwardly into the air passageway and around the temperature control and heating units before being exhausted from the tower. It would be within the capacity of one of ordinary skill to reconfigure the shape and orientation of the inlet and exhaust passages as necessary to facilitate the reversal of airflow.

Lastly, concerning the limitation requiring the air supplied by the blowing mechanisms to be "controlled": Upon entering the film-forming apparatus, the air passes through various environments, i.e., the processing units, which inevitably affect its properties. Since these environments are controlled (for temperature), the change in air properties (owing to the air's traversal of the processing units) itself represents generic "control" of the air.

Claims 9-11: A recitation concerning the manner in which a claimed apparatus is to be employed does not differentiate the apparatus from prior art satisfying the claimed structural limitations (*Ex parte Masham*, 2 USPQ2d 1647). The apparatus of Masao is capable of forming an insulating film.

Claim 30: Unit HP2 is capable of performing a low-temperature heating to dry a film, and unit HP3 is capable of executing a baking function by providing heat. HP2 is below HP3, and the air passageway is interposed therebetween.

Claims 6, 17-18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masao in view of Hirose and Kuwabara and in further view of Hayashi, US 6,350,316.

Claim 6: Masao's apparatus comprises a carrier (ID), such as an FOUP, which houses a plurality of substrates disposed in the substrate transfer section [0042]. Concerning the amount of time the substrates are stored in a transfer unit, which is interpreted as being inclusive of any chamber or casing wherein a wafer is capable of being housed: A recitation concerning the manner in which a claimed apparatus is to be employed does not differentiate the apparatus from prior art satisfying the claimed structural limitations. Also disclosed is a transfer device (TR) which transfers the substrate between a transfer unit and a plurality of process units (Drawing 2).

Masao does not teach a second transfer unit which transfers the substrate between the carrier (ID) and the transfer unit (TR). Hayashi, teaches essentially the same setup -- a transfer device (18) which conveys a wafer between process chambers (Fig. 3) and a carrier (CSB) disposed in the transfer section (3) -- further teaches a second transfer unit disposed in the transfer section which conveys a substrate between the carrier and the transfer unit, thereby indicating the suitability of the arrangement for purposes of wafer transport (6, 14-24). It would have been obvious to

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one of ordinary skill in the art at the time the invention was made to augment the apparatus of Masao with an additional transfer device to achieve the predictable result of rapid and efficient wafer conveyance.

Claim 17: Masao teaches the inclusion of an after-exposure baking unit to perform adhesion strengthening treatment [0032]. Further, the heating units, which comprise hot plates, can also perform a curing function [0020]. Regarding the placement of the curing unit: Masao is silent regarding the position of the after-exposure baking unit, and the heating units are disposed within the process section itself. Nevertheless, it has been held that rearranging the parts of an invention involves only routine skill in the art (*In re Japikse*, 86 USPQ 70). Rearranging the curing unit from a position within the processing section to a site directly adjacent would entail only ordinary skill.

Claim 18: Masao teaches units (HP) capable of performing curing functions, but these units are stacked within the substrate process section rather than adjacent to it (Drawing 2). Nevertheless, stacked curing units are well-known in the art. Figure 3 of Hayashi, as described in the previous correspondence, delineates multiple curing units (20) stacked atop of each other to compose a tower (16). Given this teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to supplement the apparatus of Masao with a tower of curing units to achieve the predictable result of increased throughput and efficient substrate transfer. Further, it has been held that rearranging the parts of an invention involves only routine skill in the art.

Claim 20: Masao only provides a general description of the coating units and does not designate their internal structures in detail. It would have been obvious for one of ordinary skill to consult a secondary reference to supplement the deficiencies of a primary reference. In this case, Hayashi, as described in the previous correspondence, discloses a coating unit suitable for incorporation within the apparatus of Masao. The unit comprises a horizontal substrate support (45); a chemical liquid supply nozzle (46) (6, 39-41); a cup (42) surrounding the substrate and fixedly attached to, and thus held by, the said substrate support (6, 53-55); and an exhaust port (50) at the cup base (6, 63-64).

As Figure 4 delineates, the exhaust port outlets the waste beneath the process section, but Hayashi is silent as to the destination of the waste. However, Hayashi teaches several processes wherein the collective waste is discharged into a chemical liquid storage tank (31). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to accumulate waste liquid from the coating section in the same or an additional storage tank to prevent hazardous chemical species from dispersing into an unprotected environment. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the

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interior structures of Hayashi's coating unit within the coating unit of Masao to achieve the predictable result of forming an insulating film on a substrate.

Claims 21-23, 32, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masao in view of Hirose, Kuwabara, and Hayashi and in further view of Nakai, US 6,071,047. It should be noted that substantial portions of these claims are drawn to structures within the coating unit taught by Hayashi and already incorporated within Masao under the rejection of claim 20.

Claims 21-23: Hayashi teaches a coating supply source (47) for storing the chemical liquid used in the coating process (5, 22-25). The means that provides the chemical liquid to the supply nozzle (46) from the supply source tank (47) is unspecified, i.e., Hayashi does not teach a pump.

Supplementing Hayashi is Nakai, disclosing an apparatus for feeding a coolant liquid to a workpiece. As Figure 10 delineates, Nakai teaches a pump (P1) that delivers a liquid to a nozzle (3) from a tank (101); the nozzle disperses the liquid over a workpiece (105) (10, 32-48). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a pump in the apparatus of Hayashi in the manner taught by Nakai given the latter's indication as to the suitability of availing a pump to provide a liquid to a nozzle from a tank.

The configuration requirements cited in claims 22 and 23 – arranging the pump “sideward of the chemical liquid tank” or on an “upper side” of the same tank – are nothing more than a rearrangement of parts that a person of ordinary skill could have reasonably predicted given the structure of Hayashi. It has been held that rearranging the parts of an invention entails only routine skill in the art (*In re Japikse*, 86 USPQ 70).

Claim 32: Although the rejection of claim 1 substantially addresses the features recited by these claims, it does not address components of a waste liquid tank, a coating liquid tank, a pump, and a substrate holding mechanism for holding the substrate. The rejection over Masao in view of Hirose and Kuwabara and in further view of Hayashi as applied to claim 20 demonstrate the obviousness of incorporating a waste liquid tank and substrate holding mechanism within the apparatus of Masao. The rejection over Masao in view of Hirose, Kuwabara, and Hayashi and in further view of Nakai as applied to claim 21 demonstrate the obviousness of incorporating a coating liquid tank and pump within the apparatus of Masao.

Claim 34: Unit HP1 is capable of curing a film.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Masao in view of Hirose and Kuwabara and in further view of Mahara et al., US 6,309,116

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Masao does not teach a device that measures film-thickness. However, the need to obtain a desired level of film thickness during the coating process is well-known in the art, thereby demonstrating the need for a device that can measure such thickness. Supplementing Masao is Mahara, who discloses a substrate processing system. Mahara avails a device (60) that measures the film-thickness of a wafer following a coating process to assess the result (6, 42-47; 8, 20-26). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to augment the apparatus of Masao with the film-thickness measuring device of Mahara to achieve the predictable result of determining the thickness of wafer-films following a coating process.

Regarding placement: The casing must be contiguous to the coating units of Masao to enable the measurement of the film. Since it has been held that rearranging the parts of an invention involves only routine skill in the art (*In re Japikse*, 86 USPQ 70), the precise placement of the casing does not bear patentable weight; nevertheless, one of ordinary skill in the art would recognize the benefit of positioning the casing between the coating unit and temperature control unit due to their close proximity -- this nearness decreases transfer time which may forestall undesired changes in substrate temperature during conveyance.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan K. Ford whose telephone number is 571-270-1880. The examiner can normally be reached on M-F, 8:30-5:00 EDT. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/N. K. F./

Examiner, Art Unit 1792

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/Karla Moore/

Primary Examiner, Art Unit 1792